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Cooma Hospital Key Worker Accommodation

Noise Impact Assessment

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TABLE OF CONTENTS

1 INTRODUCTION 4
2 REFERENCED DOCUMENTS 4
2.1 BACKGROUND INFORMATION USED 4
2.2 PLANNING GUIDELINES 4
3 SITE DESCRIPTION AND THE PROPOSAL 5
3.1 NEAREST SENSITIVE RECEIVERS 5
3.2 ENVIRONMENTAL NOISE AND VIBRATION SOURCES 5
4 AMBIENT NOISE MONITORING 7
4.1 NOISE DESCRIPTORS 7
4.2 BACKGROUND NOISE LEVELS 8
4.2.1 Measurement Equipment 8
4.2.2 Measurement Location 8
4.2.3 Measurement Period 9
4.2.4 Measured Background Noise Levels 9
4.3 SUMMARISED BACKGROUND NOISE LEVELS 10
5 EXTERNAL NOISE INTRUSION ASSESSMENT 11
5.1 NOISE INTRUSION CRITERIA 11
5.1.1 Cooma-Monaro Development Control Plan 2014 (Amendment 4) 11
5.1.2 AS/NZS 3671:1989 11
5.1.3 AS/NZS 2107:2016 12
5.1.4 Summary of Criteria 12
5.2 TRAFFIC NOISE SURVEY 12
5.2.1 Attended Noise Measurements 12
5.3 NOISE INTRUSION ANALYSIS 13
5.4 COMPLYING CONSTRUCTIONS 13
5.4.1 Glazed Windows and Doors 13
5.4.2 External Roof & Ceiling Construction 14
5.4.3 External Walls 15
5.4.4 Ventilation and Air Conditioning 15
6 NOISE EMISSION CRITERIA 16
6.1 NOISE CRITERIA 16
6.1.1 Snowy Monaro Regional Council – 'Cooma-Monaro Development Control Plan 2014 (Amendment 4)' 16
6.1.2 NSW EPA Noise Policy for Industry (NPfI) 2017 16
6.2 MECHANICAL PLANT NOISE 18
7 CONCLUSION 19
APPENDIX ONE – UNATTENDED NOISE MONITORING DATA 20

1 INTRODUCTION

This report has been prepared to assess noise impacts associated with the proposed key worker development to be located within Cooma Hospital.

Impacts assessed include:

- Traffic noise impacts.
- Operational noise emissions.

The subject site and local context are indicated in Figure 1.

The report has been prepared for the sole purpose of a development application assessment and should not be used or relied on for any other purpose.

2 REFERENCED DOCUMENTS

2.1 BACKGROUND INFORMATION USED

The assessment is based on the architectural drawings prepared by STH, project number 10521, dated 26/07/22.

2.2 PLANNING GUIDELINES

The following planning instruments and guidelines have been used in the assessment:

- Snowy Monaro Regional Council – '*Cooma-Monaro Development Control Plan 2014 (Amendment 4)'*.
- Australian and New Zealand AS/NZS 3671:1989 - *'Acoustics - Road traffic noise intrusion - Building siting and construction'*.
- Australian and New Zealand AS/NZS 2107:2016 - *'Recommended design sound levels and reverberation times for building interiors'*.

3 SITE DESCRIPTION AND THE PROPOSAL

The project site is located at Bent Street (Lot/DP2/1161366) also known as Cooma Hospital.

3.1 NEAREST SENSITIVE RECEIVERS

The following table lists the nearest sensitive receivers surrounding the site. An aerial photo of the site indicating nearby noise sensitive receivers and measurement locations is presented in Figure 1.

Table 1 – Sensitive Receivers

Receiver (Refer Figure 1)	Land Use	Comment
R1	Residential	Single storey residential dwellings to the north at 33-45 Victoria Street and 81 Bombala Street.
R2	Residential	Single storey residential dwellings to the east at 92-96 Bombala Street.
C1	Commercial	Single storey commercial premises to the east at 98 Bombala Street.
R3	Residential	Single storey residential dwelling to the east at 102 Bombala Street.
R4	Residential	Single storey residential dwellings to the east at 106 and 108 Bombala Street.
R5	Residential	Single storey residential dwellings to the west at 103 Bombala Street and 31-35 Campbell Street.
C2	Commercial	Single storey commercial premises west of the site at 37-43 Campbell Street.
R6	Residential	Single storey residential dwellings at 3-11 and 46-48 Victoria Road with two-storey townhouses located at 1 Bent Street.

3.2 ENVIRONMENTAL NOISE AND VIBRATION SOURCES

The most significant environmental noise source impacting the project site is traffic noise from the Monaro Highway/Bombala Street to the east of the project site, as well as Victoria Street and Bent Street which are adjacent to the northern and western boundaries of the project site.

Figure 1 – Aerial site Map with Nearest Sensitive Receivers and Noise Monitoring Locations

- Unattended Noise Monitoring Location - Attended Noise Monitoring Location	- Residential - Commercial - Site

4 AMBIENT NOISE MONITORING

Monitoring has been undertaken to obtain the following data:

- Background noise levels at the surrounding residential properties.
- Traffic noise levels.

Figure 1 above visualises the monitoring locations used.

4.1 NOISE DESCRIPTORS

Ambient noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify ambient noise, a 15 minute measurement interval is typically utilised. Noise levels are monitored continuously during this period, and then statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters obtained from the data are:

L_{eq} - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of time-varying noise sources (such as traffic noise).

L_{90} – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

L_{10} is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

L_{max} is the highest noise level produced during a noise event, and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

L_1 is sometimes used in place of L_{max} to represent a typical noise level from a number of high level, short term noise events.

4.2 BACKGROUND NOISE LEVELS

A long-term ambient noise survey has been carried out by this office. Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

4.2.1 Measurement Equipment

Unattended noise monitoring was conducting using one (1) Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

4.2.2 Measurement Location

An unattended noise monitor was installed onsite of the existing hospital at Bent Street, Cooma. For a detailed monitor location, refer to Figure 1. A photo of the installed monitor is presented in Figure 2 below.

Figure 2: Unattended Noise Monitor

4.2.3 Measurement Period

Unattended noise monitoring was conducted from Tuesday the 20th of September 2022 to Wednesday the 5th of October 2022.

4.2.4 Measured Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in Table 3-1 below.

4.2.4.1 Unattended Noise Measurements

NSW EPA's RBL assessment procedure requires determination of background noise level for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendix 1 provides the results of the unattended background noise monitoring. Rain affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in Table 3-1 below.

Table 4-1 – Unattended Noise Monitor - Assessment Background Noise Levels

Date	Assessment Background Noise Level dB(A)L_{A90}		
	Day (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am Next Day)**
Tuesday 20 September 2022	-	38	34
Wednesday 21 September 2022	45	35	30
Thursday 22 September 2022	38	34	32
Friday 23 September 2022	44	30	-
Saturday 24 September 2022	36	32	31
Sunday 25 September 2022	37	34	31
Monday 26 September 2022	42	-	-
Tuesday 27 September 2022	-	32	-
Wednesday 28 September 2022	-	-	-
Thursday 29 September 2022	41	30	-
Friday 30 September 2022	42	31	26
Saturday 1 October 2022	36	33	30
Sunday 2 October 2022	36	31	31
Monday 3 October 2022	37	28	29
Tuesday 4 October 2022	41	-	26
Wednesday 5 October 2022	-	-	-
Median	**40**	**32**	**31**

Note: Periods marked '-' have had more than 20% of data within the nominated period be affected by adverse weather and in accordance with Fact Sheets A and B of the NPfI, have been removed from the assessment.

4.3 SUMMARISED BACKGROUND NOISE LEVELS

The following table presents the summarised background noise levels for individual sensitive receivers maintained near the development site.

Table 4-2 -Summarised Rating Background Noise Level

Receiver	Time of day	Rating Background Noise Level dB(A)$L_{A90(Period)}$
All Sensitive Receivers	Day (7am-6pm)	40
	Evening (6pm-10pm)	32
	Night (10pm-7am)	31

5 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise source around project site is traffic movements from Bombala Street / Monaro Highway.

5.1 NOISE INTRUSION CRITERIA

A noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards:

- Snowy Monaro Regional Council – 'Cooma-Monaro Development Control Plan 2014 (Amendment 4)'.
- Australian and New Zealand AS/NZS 3671:1989 - *'Acoustics - Road traffic noise intrusion - Building siting and construction'*
- Australian and New Zealand AS/NZS 2107:2016 - *'Recommended design sound levels and reverberation times for building interiors'*.

5.1.1 Cooma-Monaro Development Control Plan 2014 (Amendment 4)

Section 3.3.4 of the Cooma-Monaro DCP specifies further information must '*refer to Australian Standards AS 3671 Road Traffic Noise Intrusion and AS 2107 Acoustics for Noise Attenuation Design and Construction*'. Hence, Acoustic Logic will adopt relevant Australian Standards and guidelines as a basis for this assessment.

5.1.2 AS/NZS 3671:1989

Australian Standard AS/NZS 3671:1989 *'Acoustics—Road traffic noise intrusion—Building siting and construction'* notes the following in relation to traffic noise:

- Internal noise levels should be determined in accordance with AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors'.
- A suitable descriptor should be adopted relevant to the use of the development. As AS2107:2016 adopts the L_{eq} descriptor, Acoustic Logic shall also use this descriptor.
- AS3671 does not specifically recommend a time interval. On this basis, Acoustic Logic have adopted the interval used by the EPA Road Noise Policy for main/arterial roads, that being:
  - Day – 7am to 10pm (15 hour); and
  - Night – 10pm to 7am (9 hour).
- Acoustic Logic have applied the daytime interval to the living/dining areas and the night time interval to the bedrooms of residential spaces.

Internal noise levels have been selected in accordance with AS 2107:2016, as presented in the below section.

5.1.3 AS/NZS 2107:2016

AS2107-2016 recommends design criteria for internal spaces within various types of spaces/occupancies to ensure a healthy, comfortable and productive environment for the occupant. For the basis of this assessment, AL will use the upper range.

Table 5-1 – Recommended Design Sound Level

Space /Activity Type	Recommended Design Internal Noise Level dB(A)$L_{eq\ (Period)}$
Sleeping Areas (Night-time)	30 - 35
Living Areas	30 - 40
Common Rooms	40 - 45

5.1.4 Summary of Criteria

The governing project criteria is presented in the Table 4-2 below based on requirements above.

Table 5-2 – Summary of Internal Noise Level Criteria

Space/Activity Type	Internal Traffic Noise Criteria dB(A)$L_{eq(period)}$
Bedroom	35dB(A)$L_{eq(9hour)}$
Living Room	40dB(A)$L_{eq(15hour)}$
Indoor Shared Area	45dB(A)$L_{eq(When\ in\ use)}$

5.2 TRAFFIC NOISE SURVEY

5.2.1 Attended Noise Measurements

This section of the report details the attended noise measurements conducted at the site to establish noise levels impacting the development.

5.2.1.1 Measurement Position

Three (3) attended noise measurements were undertaken to investigate the noise levels at the proposed development. Individual noise measurements were conducted on the northern (Victoria Street), eastern (Bombala Street/Monaro Highway) and western (Bent Street) boundaries of the site, approximately 3m from the adjoining roads,

5.2.1.2 Measurement Period

The attended noise measurements were conducted on Tuesday the 20th September 2022 between 12:30pm and 1:30pm.

5.2.1.3 Measurement Equipment

The measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

5.2.1.4 Measured External Noise Levels

The measured external noise levels for the attended measurements are presented in the table below.

Table 5-3 – Measured Noise Levels at Attended Measurement Locations

Measurement	Measurement Location	Time of day	Measured Noise Level dB(A)$L_{eq(15min)}$
1	Bombala Street / Monaro Highway at 3m from the curb	Tuesday the 20th of September 2022 12:30pm – 1:30pm	62
2	Victoria Street at 3m from the curb		54
3	Bent Street at 3m from the curb		55

5.3 NOISE INTRUSION ANALYSIS

Noise intrusion into the proposed development was assessed using the measured noise levels presented above.

Calculations were undertaken taking into account the orientation of windows, barrier effects *(where applicable)*, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way, the likely interior noise levels can be predicted.

5.4 COMPLYING CONSTRUCTIONS

5.4.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in Table 5-4.

Table 5-4 – Minimum Glazing Constructions

Location	Level	Space	Facade	Minimum Glazing Construction	Acoustic Seals
North-West Block	All	All Spaces	All Facades	6mm Float	**Yes**
North-East Block					
South Block					

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 4-5 below. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 5-5 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window	Acoustic Seals
6mm Float	29	**Yes**

5.4.2 External Roof & Ceiling Construction

The external roof construction has not yet been proposed, the following light weight construction will satisfy the internal noise level criteria.

Table 5-6 – External Light Weight Roof Construction

Site	Level	Space	Internal Lining	Truss System	External Lining
Cooma Hospital Key Worker Accommodation	All Levels	All Spaces	1 x 13mm Plasterboard	Minimum of 250mm truss with 75mm thick 11kg/m^3 glasswool insulation	0.5mm Steel Sheet Metal

The above external light weight roof construction nominated in Table 5-6 above is the minimum recommended roof construction required for the development to satisfy the internal noise level requirements detailed in Section 5.4.1. If the proposed roof construction differs from the above system, it is to be reviewed by an acoustic engineer prior to installation.

In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

5.4.3 External Walls

The external wall construction has not yet been proposed, the following construction will satisfy the appropriate criteria.

Table 5-7 – External Light Weight Wall Construction

Site	Building	Level	Space	Internal Lining	Truss System	External Lining
Cooma Hospital Key Worker Accommodation	NW Block	Ground	All Spaces	1 x 13mm Plasterboard	Minimum 90mm timber stud with 75mm thick 11kg/m^3 glasswool insulation to the stud cavity	9mm Fibre Cement sheet
	NE Block					
	South Block	Ground				
		Level 01				

The above external light weight wall construction nominated in Table 5-7 above is the minimum recommended external wall construction required for the development to satisfy the internal noise level requirements detailed in Section 5.4.1. If the proposed wall construction differs from the above system, it is to be reviewed by an acoustic engineer prior to installation.

In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

5.4.4 Ventilation and Air Conditioning

As referenced in Section 5.1.2, the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline)' specifies the following controls regarding natural ventilation:

- With respect to natural ventilation of a dwelling the allowable internal noise goal is permitted to be 10 dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45 dB(A), and 50 dB(A) in living rooms). Where noise levels would exceed this, the NSW Planning guideline recommends that an alternative source of ventilation be considered to achieve the ventilation requirements of the BCA with windows closed.

- Noting this, based on the measured noise levels all façades of the proposed residential areas may achieve required internal noise levels with windows/doors open to 5% of the floor area

Any supplementary ventilation system or façade opening proposed to be installed to provide ventilation to apartments should be acoustically designed to ensure that the internal noise level requirements are achieved. In the event mechanically assisted ventilation is utilised, it should be acoustically designed so that internal noise levels within apartments are appropriate, and any external noise emissions to surrounding noise sensitive receivers is within the requirements detailed in Section 6.1 of this report.

6 NOISE EMISSION CRITERIA

The noise emissions from the project site shall comply with the requirements of the following:

- Snowy Monaro Regional Council – '*Cooma-Monaro Development Control Plan 2014 (Amendment 4)'*.
- NSW Department of Environment and Heritage, Environmental Protection Authority document – '*Noise Policy for Industry (NPfI) 2017*'.

6.1 NOISE CRITERIA

6.1.1 Snowy Monaro Regional Council – 'Cooma-Monaro Development Control Plan 2014 (Amendment 4)'

The Snowy Monaro Regional Council *'Cooma-Monaro Development Control Plan 2014 (Amendment 4)'* does not provide any acoustic controls or objectives relating to noise emissions, therefore; this assessment will adopt the NSW EPA Noise Policy for Industry (2017) criteria.

6.1.2 NSW EPA Noise Policy for Industry (NPfI) 2017

The NSW EPA Noise Policy for Industry (NPfI) 2017, has two criteria which need to be satisfied; namely the Intrusiveness noise level criteria and the Project amenity noise level criteria. The project noise trigger level is then established based on the lower of the intrusiveness and project amenity levels.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

6.1.2.1 Intrusiveness Noise Level Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 4.3. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 9 – Intrusiveness Noise Level Criteria

Location	Period/Time	Intrusiveness Noise Level Criteria dB(A)$L_{Aeq(15min)}$
All Sensitive Residential Receivers	Day (7am-6pm)	45
	Evening (6pm-10pm)	37
	Night (10pm-7am)	36

6.1.2.2 Project Amenity Noise Level Criteria

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The NSW EPA Noise Policy for Industry sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban, urban. This site is categorised as suburbanreceivers.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

The project amenity noise level is calculated by taking the recommended amenity noise level (as presented in table 2.2 of the policy), subtracting 5dB(A) and then adding 3dB(A) to convert from $L_{Aeq,\ period}$ to a $L_{Aeq,\ 15\ minute}$ descriptor. The project amenity noise level criteria are presented in the table below.

Table 10 – Project Amenity Noise Level Criteria

Location	Period/Time	Project Amenity Noise Level Criteria dB(A)$L_{Aeq(15min)}$
Nearby residences – rural receivers	Day (7am-6pm)	53
	Evening (6pm-10pm)	43
	Night (10pm-7am)	38
Commercial	When in Use	63

6.1.2.3 Project Noise Trigger Level

The project noise trigger level (as outlined in section 2.1 of the policy) is the lower of the intrusiveness and project amenity noise levels. The project noise trigger levels are presented in the table below.

Table 11 – Project Noise Trigger Level Criteria

Location	Period/Time	Project Noise Trigger Levels dB(A)$L_{Aeq(15min)}$
All residential receivers	Day (7am-6pm)	45
	Evening (6pm-10pm)	37
	Night (10pm-7am)	36
All commercial receivers	When in Use	63

6.2 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 6.1.

7 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed key worker accommodation to Cooma Hospital at Bent Street, Cooma.

Internal noise criteria for external noise impacts have been formulated with reference to the following documents:

- Snowy Monaro Regional Council – '*Cooma-Monaro Development Control Plan 2014 (Amendment 4)'*.
- Australian and New Zealand AS/NZS 3671:1989 - *'Acoustics - Road traffic noise intrusion - Building siting and construction'*.
- Australian and New Zealand AS/NZS 2107:2016 - *'Recommended design sound levels and reverberation times for building interiors'*.

External noise emissions criteria have been established in this report to satisfy the requirements from the following documents:

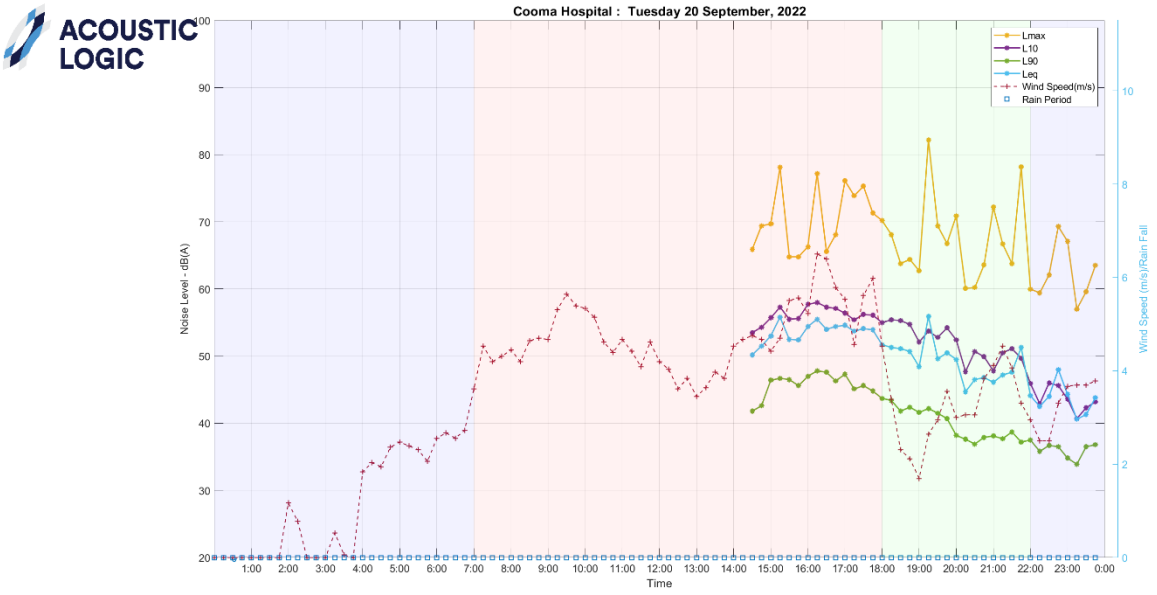
- Snowy Monaro Regional Council – '*Cooma-Monaro Development Control Plan 2014 (Amendment 4)'*.
- NSW Department of Environment and Heritage, Environmental Protection Authority document – '*Noise Policy for Industry (NPfI) 2017*'.

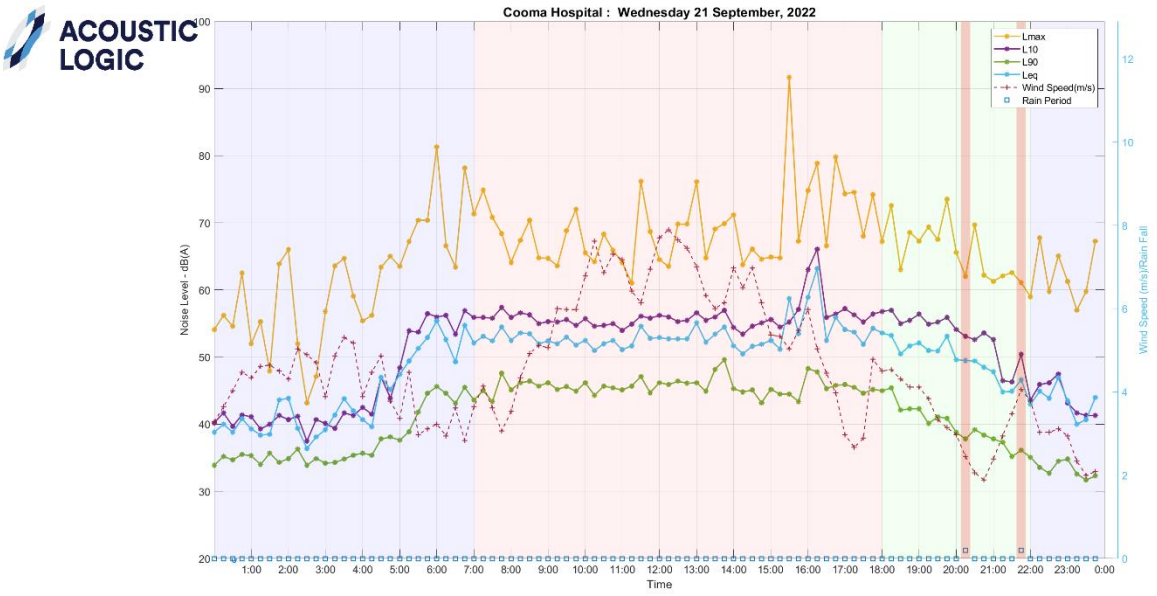
We trust this information is satisfactory. Please contact us should you have any further queries.

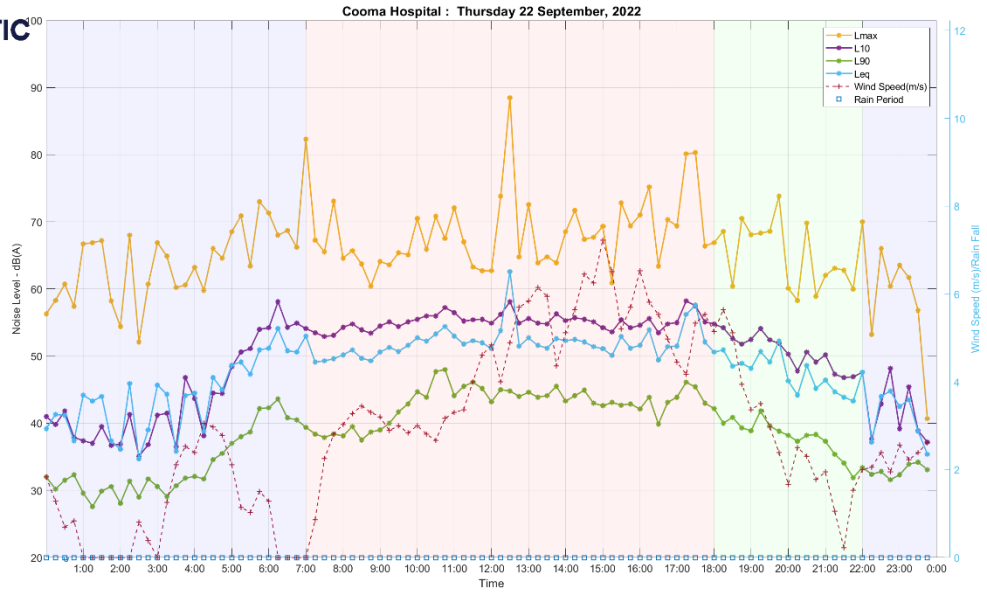
Yours faithfully,

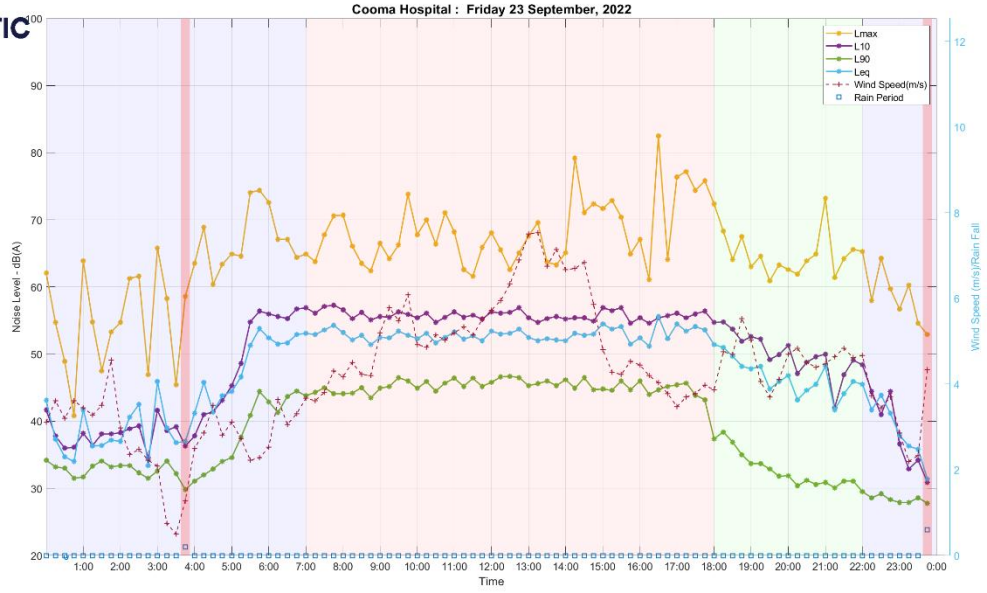
Acoustic Logic Pty Ltd
Justine Wade

APPENDIX ONE – UNATTENDED NOISE MONITORING DATA






Cooma Hospital : Thursday 22 September, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time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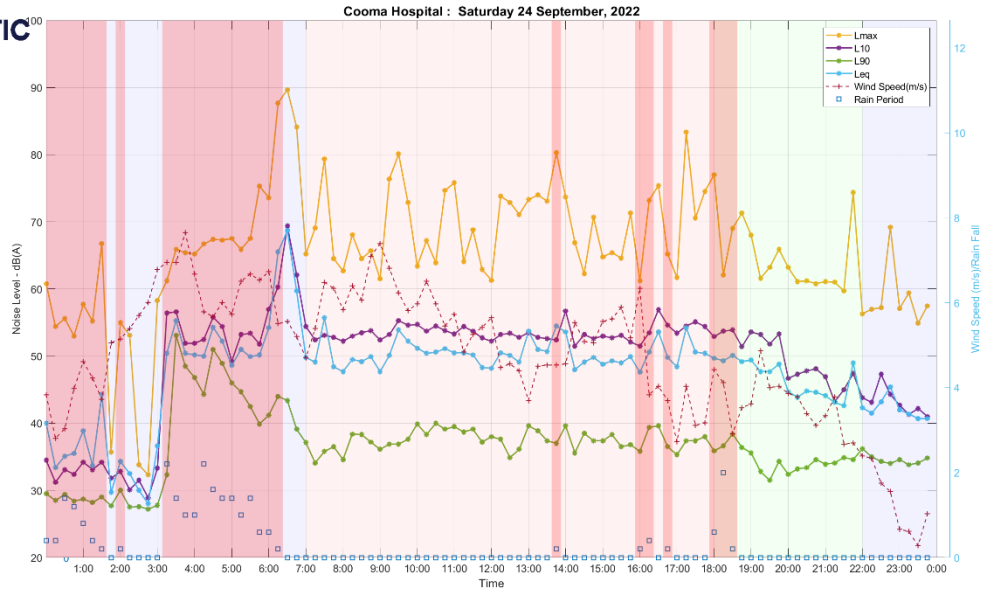
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time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Lmax
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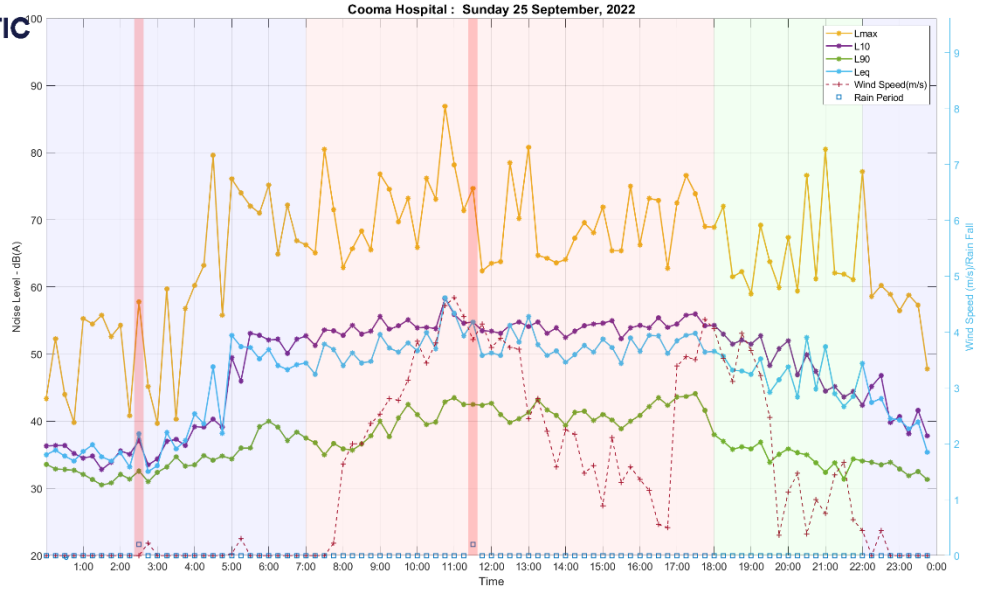
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time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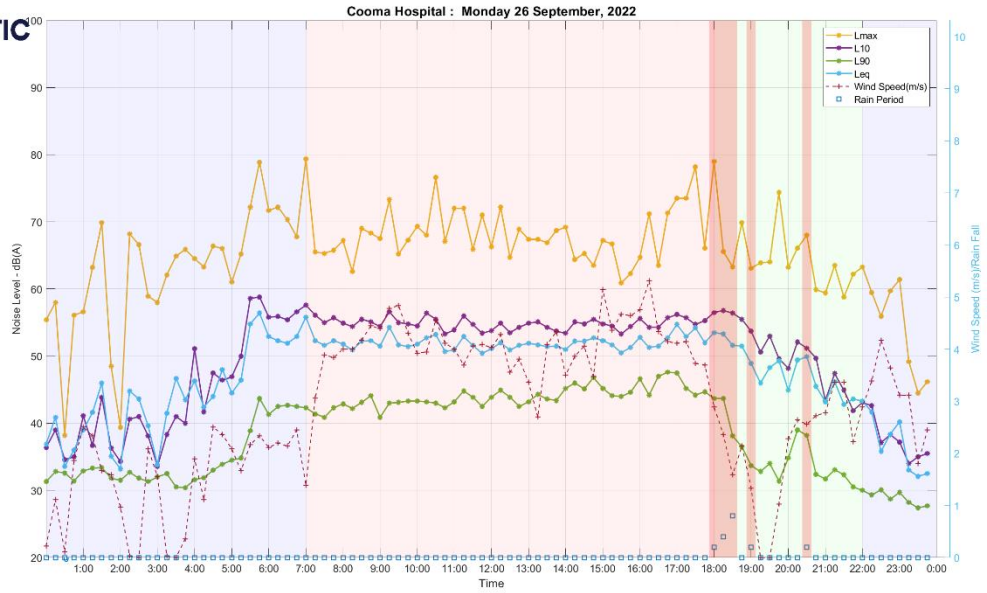
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Monday 26 September, 2022
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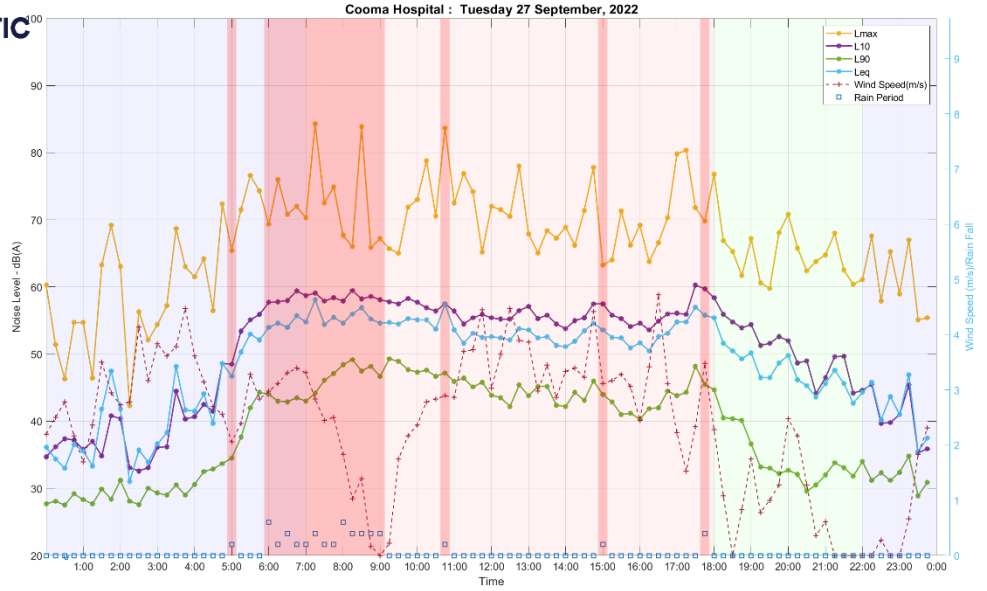
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time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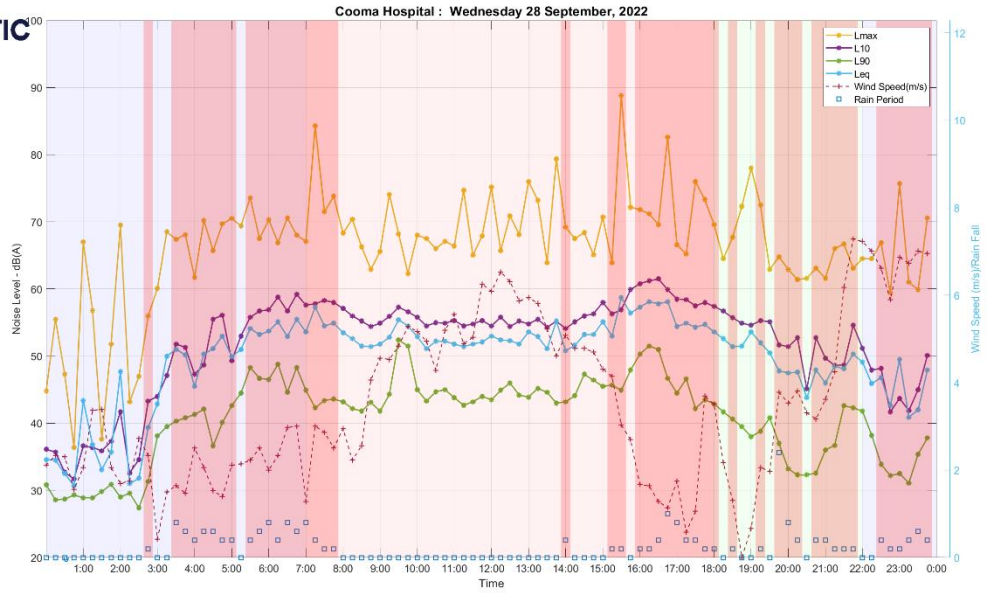
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time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Lmax
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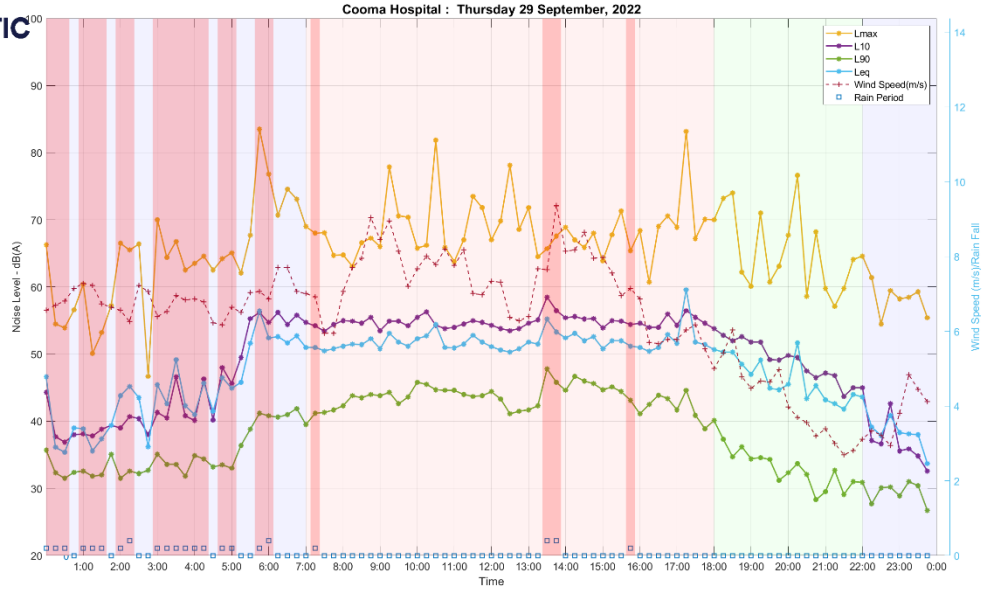
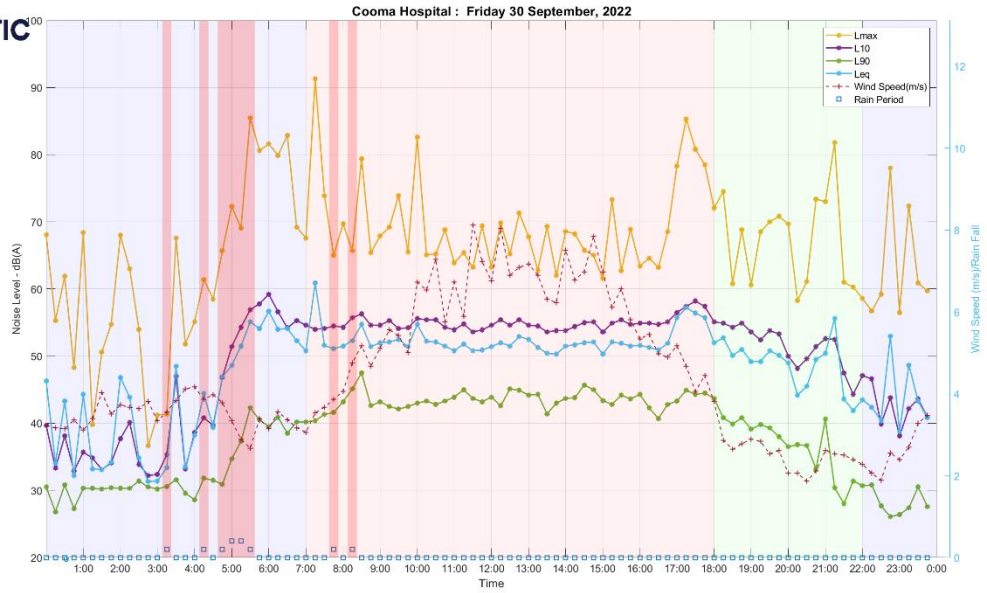
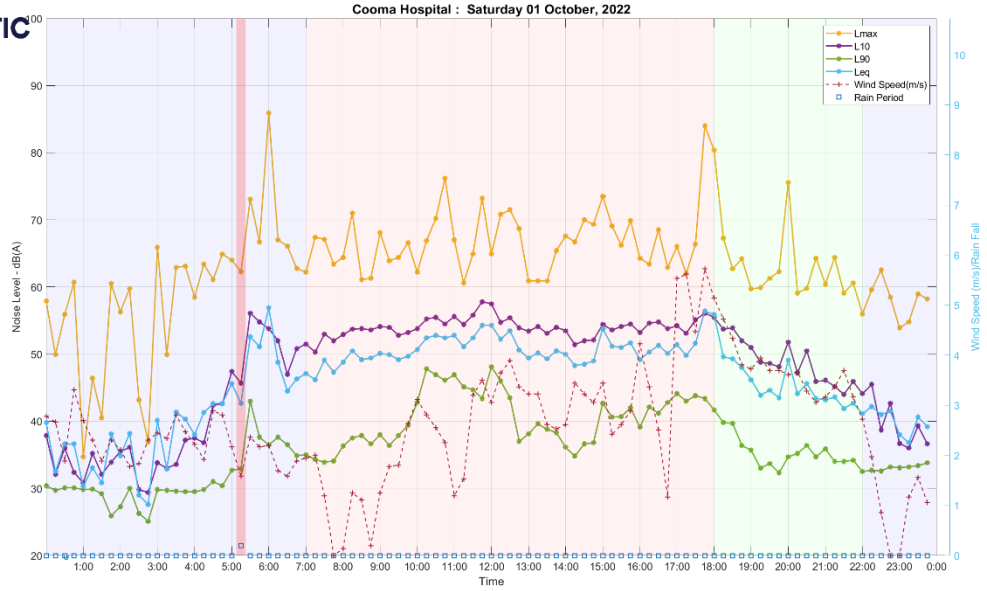
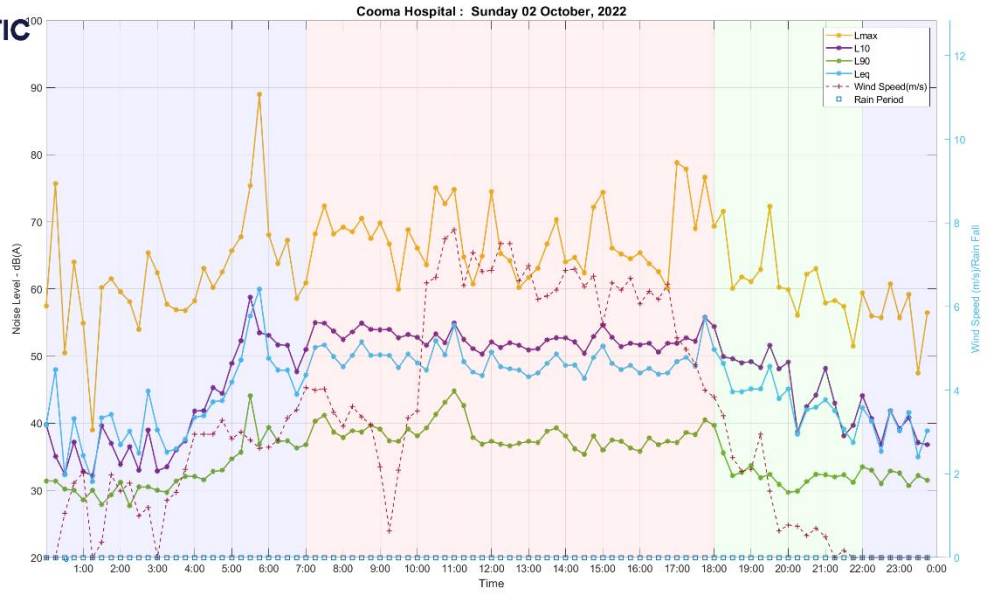
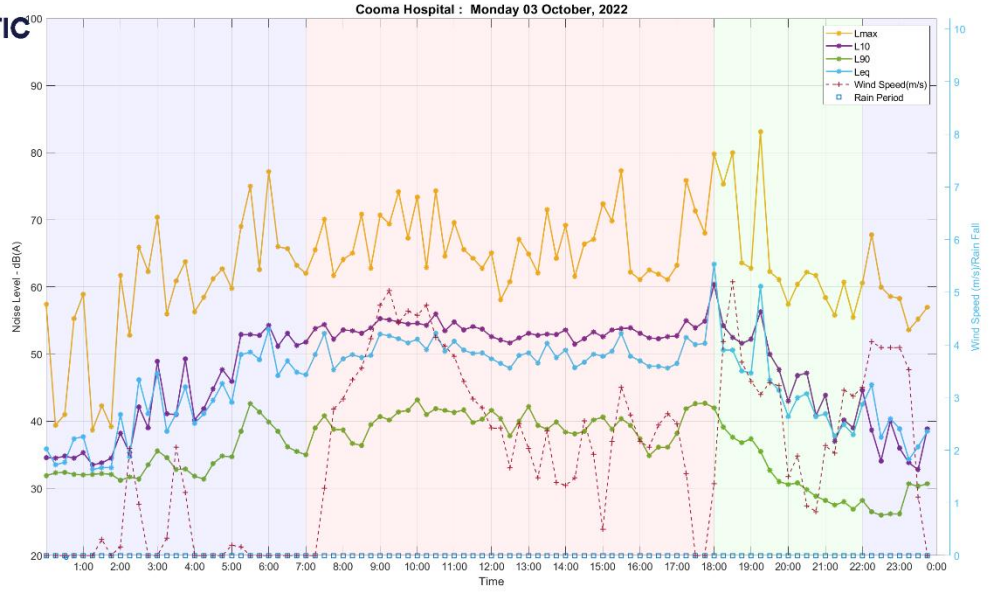
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time

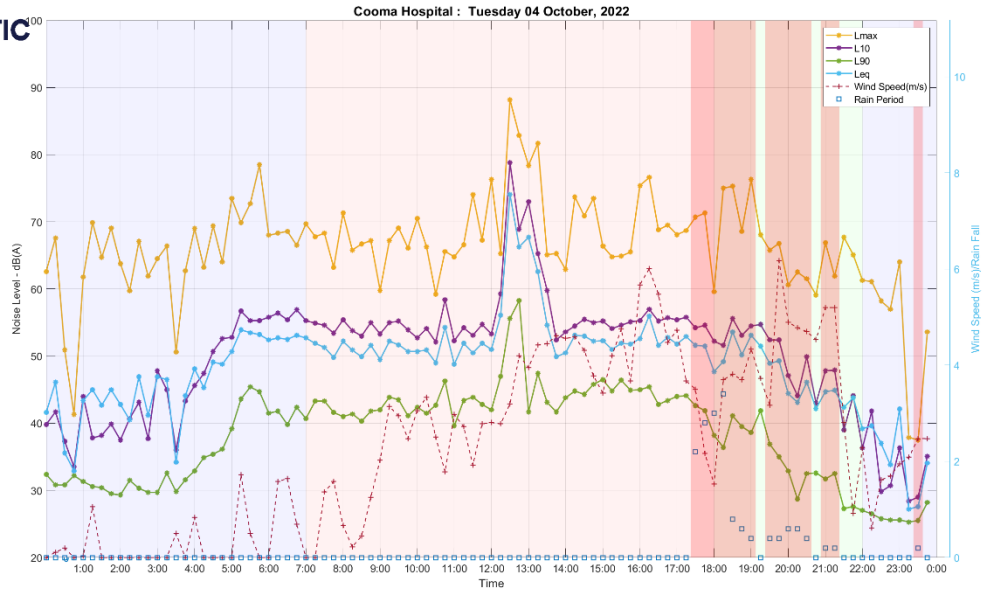

Cooma Hospital : Thursday 29 September, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time

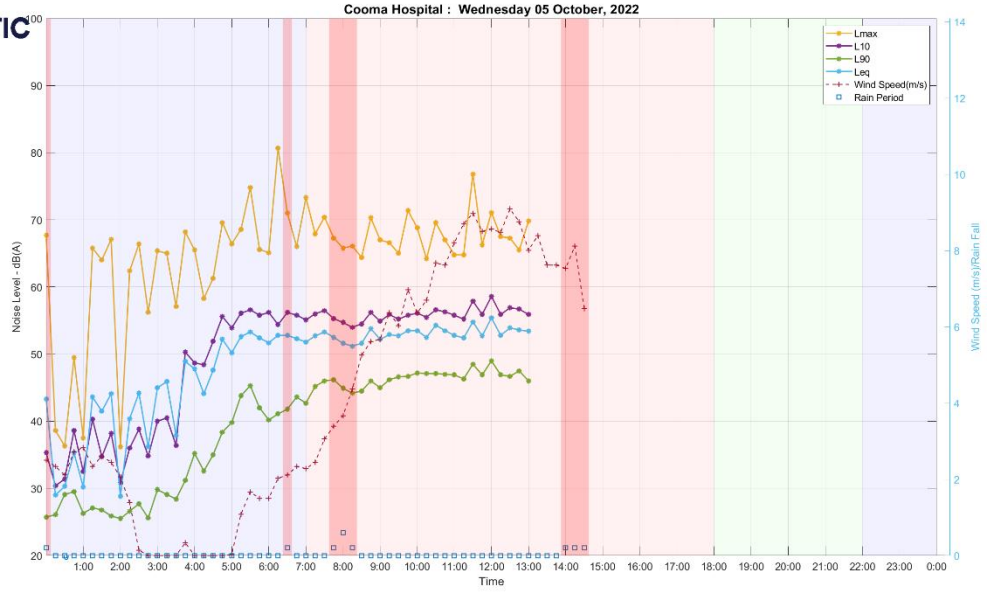

Cooma Hospital : Friday 30 September, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Saturday 01 October, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Sunday 02 October, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Monday 03 October, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Tuesday 04 October, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time


Cooma Hospital : Wednesday 05 October, 2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time